A new phase space method for recovering index of refraction from travel times

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Abstract

In this talk, we present a new phase space method for reconstructing the index of refraction of a medium from travel time measurements. The method is based on the so-called Stefanov-Uhlmann identity which links two Riemannian metrics with their travel time information. We design a numerical algorithm to solve the resulting inverse problem. The new algorithm is a hybrid approach that combines both Lagrangian and Eulerian formulations. In particular the Lagrangian formulation in phase space can take into account multiple arrival times naturally, while the Eulerian formulation for the index of refraction allows us to compute the solution in physical space. This is a joint work with Gunther Uhlmann, Jianliang Qian and Hongkai Zhao.